

Solo Project: The Comparison of Cost Damage by Storm

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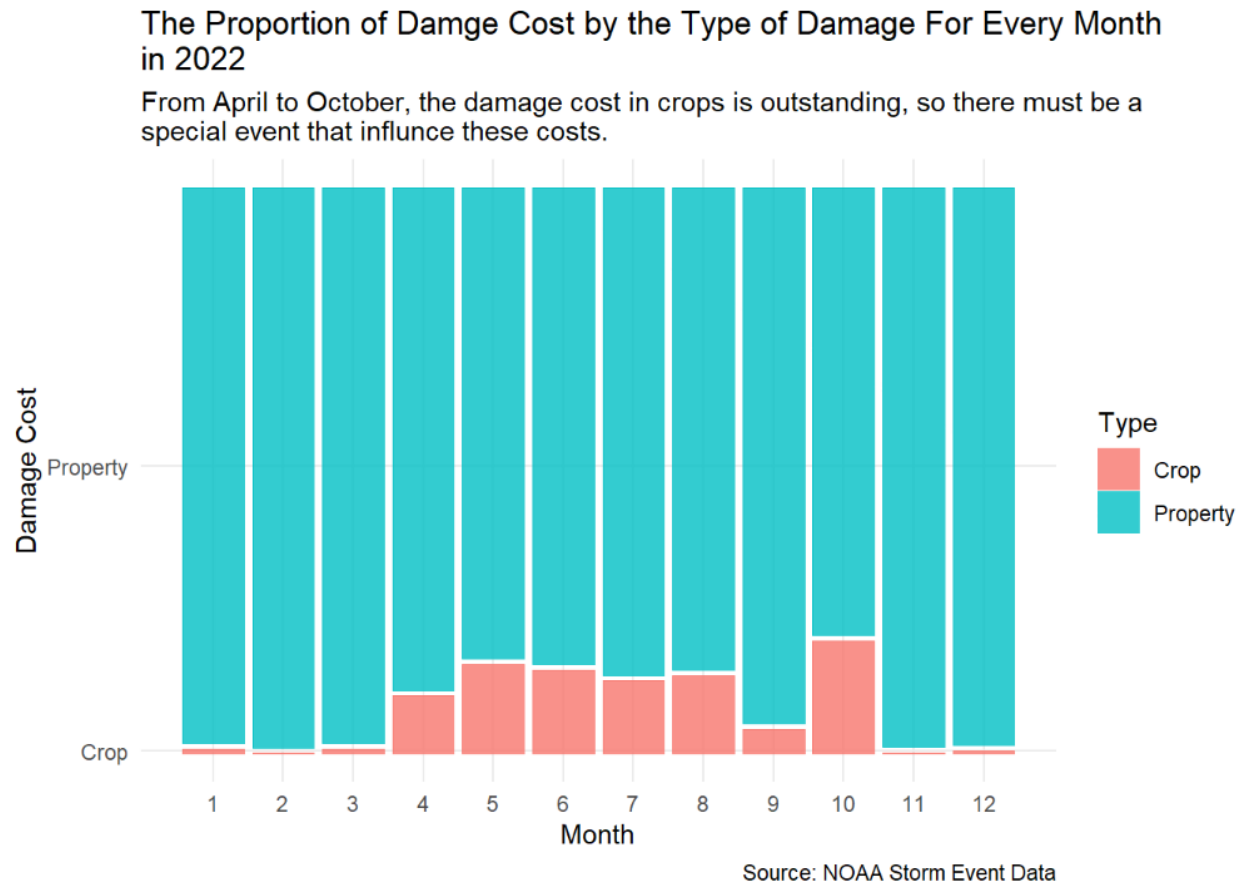
STA 404: Advanced Data Visualization

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I. Introduction

In the Storm Events Details in 2022, we can see many columns, but if we compare the months in 2022, we can see that although the property damage cost is always outstanding, the crop damage cost is very noticeable from April to October. These months are mainly in the summer, which is quite well known for the dryness.



II. The relationship in damage cost between crops and property

I decided to split the data into 2 groups, one group includes the events that affect people's lives and another one that does not influence humans' lives.

The table below contains only 15 data events, which are the storm events that did not influence people's life in 2022. However, from this table, we can see those 5 events, which are coastal flood, astronomical low tide, lakeshore flood, marine thunderstorm wind and waterspout, were strong enough to damage the property, and only coastal flood damaged the crops. The other 10 storm events were not strong enough to damage anything. Furthermore, although coastal floods are the only one that has both the damage costs in crop and property, we can see that the crops damage cost is very low, compared to the property damage cost.

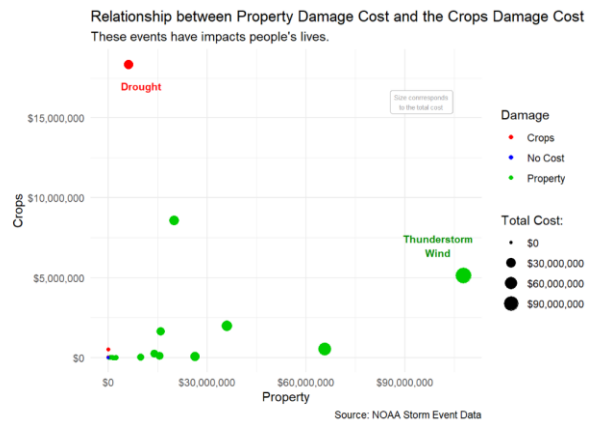
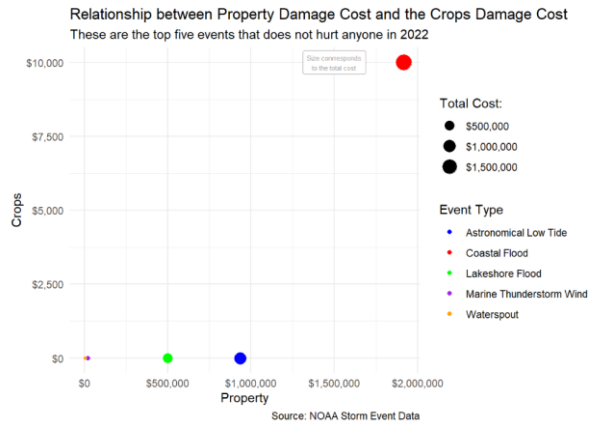
- Coastal floods are a serious issue because they can result in considerable infrastructure damage, population displacement, etc. While contaminated floodwaters can pose a health danger to both people and wildlife, erosion and land loss can result in the loss of important ecosystems and habitats. The issue is being made worse by climate change,

which is resulting in higher sea levels and more intense and frequent storms. This may be the main reason why although coastal floods do not harm anyone, they still create a huge cost damage to both crops and property.

EVENT_TYPE	Indirect	Direct	Crops	Property	Cost
Coastal Flood	0	0	10000	1918000	1928000
Astronomical Low Tide	0	0	0	935000	935000
Lakeshore Flood	0	0	0	500000	500000
Marine Thunderstorm Wind	0	0	0	20000	20000
Waterspout	0	0	0	6000	6000
Dense Smoke	0	0	0	0	0
Frost/Freeze	0	0	0	0	0
Funnel Cloud	0	0	0	0	0
Marine Hail	0	0	0	0	0
Marine High Wind	0	0	0	0	0
Marine Hurricane/Typhoon	0	0	0	0	0
Marine Tropical Depression	0	0	0	0	0
Seiche	0	0	0	0	0
Tsunami	0	0	0	0	0
Volcanic Ashfall	0	0	0	0	0

The left graph is built based on the top 5 event types that do not damage the people's lives. We can see that except the coastal flood, the other four event types do not have crops damage cost, and they are also much smaller than the coastal flood's damage cost.

The right graph is built based on events that influence people's lives. We can see two outstanding points, which are drought and thunderstorm wind.



- Drought may increase agricultural damage costs by lowering crop yields, raising production costs, causing crop failures, and hurting crop quality. These issues can lead to lower farm revenue, increased consumer prices, and substantial financial consequences for the agricultural sector.
- Thunderstorm-related strong winds can uproot trees, damage roofs, and cause power outages. This can lead to property damage and business interruptions, both of which can be expensive to repair and replace. Furthermore, severe winds can result in flying debris, which can endanger persons and property.

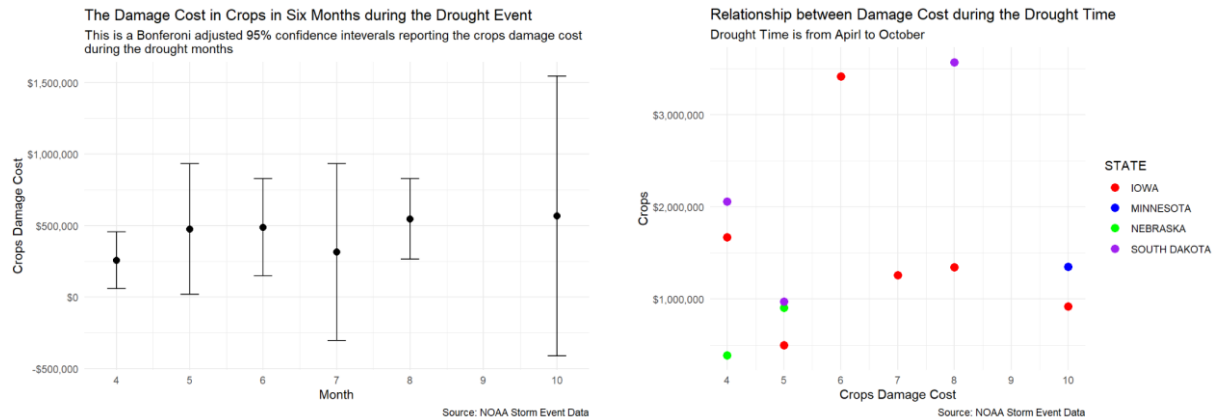
We can see that these costs related to strong storms are much higher than the cost if there is no one injured. Thunderstorm wind is the one with the biggest size due to its total cost, but also the highest property cost, which is way bigger than the rest of the group. Meanwhile, drought may have an average size, but it has the highest crop damage costs. This can be understood because the weather is very bad, and we are unable to grow the crops. From this graph, we can also see that the number of circles is not equal to the database we have filtered. The main reason is that there is a no-cost group. These kinds of events do not influence the cost of crops or property, but it is slightly dangerous to injure people.

From these two graphs, we can conclude that the significant reason that influences the crops damage cost may be the drought. Now, we will check the drought events to see which months it happened the most.

III. The Drought Event

From these two graphs below, our assumption is correct, the drought usually takes place from April to October, and it is like the mosaic plot we draw above. However, there is no drought in September, so that means there are many other events that influence the crop damage cost in 2022.

The left graph compares Bonferroni adjusted 95% confidence intervals reporting the damage cost in crops in the drought event. We can clearly see that July and October have a large 95% confidence intervals. The wider the interval, the less precise our estimate, and the more uncertain we are about the true population parameter. These months are in Fall, but the drought still happened, and the average crop damage cost in October is also highest, which is very rare to happen. This shows how serious the drought in 2022 looks like.

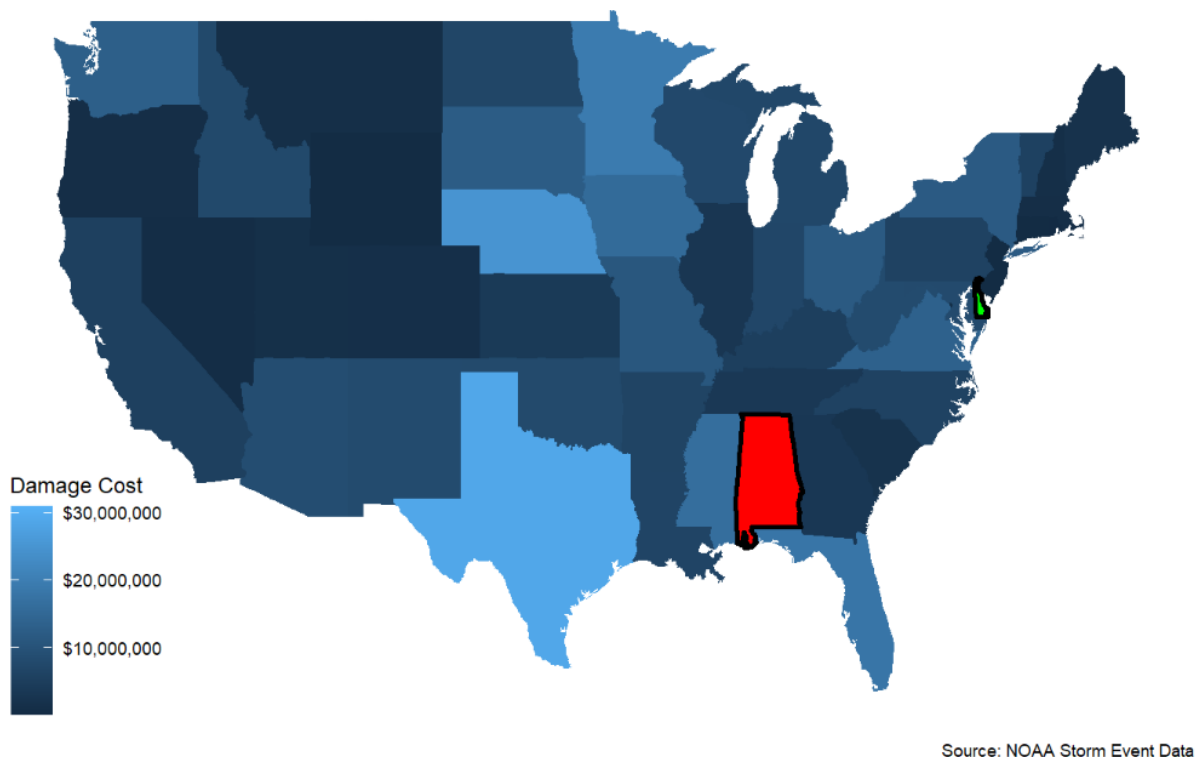


The scatter plot shows states that suffer the drought in 2022. There are only four states, but Iowa must deal with drought the most. Iowa is in the midwestern United States, which is a region that is prone to drought conditions due to its continental climate.

IV. Conclusion

The Damage Cost in 56 States in USA in 2022

The lowest damage cost is Delaware, and the highest damage cost is Alabama



Although the damage cost in crops in Iowa is highest, from this map, the highest total cost is in Alabama, which means most storm events influence badly to the property way more than crops. From this report, we can conclude that the drought has happened more and from the confidence interval, we are uncertain about the true population parameter of the drought event. Overall, in the past year, each state had to spend at least \$30,000,000 dollars to repair the damage.

V. References

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